

## THE THEORY OF COLOR

Color begins with light. The sensation of color is aroused in the human mind by the way in which the eyes and the brain centers of sight respond to the waves of light which brings the world into our perceiving consciousness. The perception of color is, therefore, a highly personal experience. It is influenced by association and aesthetic values by fatigue, by sharpness of vision and by color blindness. Yet for all human eyes, the perception of color is linked firmly to physical reality and depends first of all on the nature of light.

The waves of visible light are a narrow band in the known spectrum of radiant energy. This spectrum moves from the invisible, miles-long waves of radio through the infra-red waves of heat across the visible wave lengths of color to the invisible ultra-short ultraviolet waves and on out to the infinitely short waves of cosmic rays. When a beam of white light is dispersed by a prism and separated into its component wave lengths, as above, it is seen at once that each of these wave lengths stimulates a different color response in the human eye.

White is the total addition of color. It is perceived when a surface reflects all colors equally. Black is the total subtraction of all color. It is perceived when a surface absorbs all colors equally. White and black are exceptions in nature. The rule is the partial absorption and hence subtraction of a band of color from the spectrum and the reflection or transmission of the rest. The mixture of the reflected or transmitted spectrum colors is the color of an object.





### The Theory of Color (Con't)

All colors, even the pure colors of the spectrum, can be produced by mixture. There is one class of colors, called primaries, which perform this operation most efficiently. Despite widespread misconceptions to the contrary, the primary colors of light are red, green and blue (however for color mixing with paints, the primary colors are red, blue and yellow). These three colors are related directly to three response factors in the mechanism of human vision about nothing is known except that they resolve mixtures of wave lengths into mixtures of colors. The three primaries cannot be broken down into component colors. They can be produced by mixture only when they are themselves components of the mixing colors. When added in pairs or all together in equal or unequal strengths they produce all of the possible colors, including the mixture of red and blue (the purples), which do not appear in the spectrum, and white. In fact, for all practical purposes in color mixture, white light may be defined as a mixture of red, green and blue.

Color tricks and illusions demonstrate the basic effects of contrast, harmony and clash, which arise as soon as two colors are used together. The most important fact being that in the use of color the eye sees colors differently against different backgrounds. These effects can be explained by elementary color science. From here out in color, however, science is left behind and aesthetics take over.

